



# **EPA Combined Heat and Power Partners: Niche Markets May 12, 2004**

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## ***CHP for Housing and Community Development***

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# HUD 2002 Energy Action Plan

- HUD Dep. Sec. Jackson's Energy Task Force-  
to support 2001 *National Energy Policy*
- Energy Action Plan approved by (now)  
Secretary Jackson included:
  - "Promote use of CHP..."
  - "Promote use of ENERGY STAR..."



# Why CHP for Multifamily?

## Favorable Conditions

- Aggregated thermal loads
- Many all-electric buildings
- Appropriate scale for several DOE/industry package systems
- Multifamily sector is low risk—according to Moody's
- District energy systems can provide heating/cooling to multiple buildings in urban areas
- Desiccant dehumidifiers reduce potential for mold and bacteria growth
- Hydronic heating could use hot water or steam



# **HUD Housing Markets**

## **Apartment Buildings: 50+Units**

- Public Housing: 7,100 properties
- FHA Insured: 15,600 properties



# HUD CHP “Markets”

## Three housing “markets”

- Public, non-profit, FHA insured

## Plus Community Development “markets”

- Brownfield
- Community Development Block Grant



# Local Public Housing Economics

- HUD funds for utilities
- HUD funds for capital improvement
- Payback can be longer, e.g. 10-15 years
- Energy performance contracts: 12 years
- CHP maintenance contract supports  
PHA management



# FHA Market “Economics”

- Payback of 3-5 years
- Use of depreciation
- FHA may release reserves
- FHA keeps 1<sup>st</sup> mortgage position



# Nonprofit Housing-Elderly Projects

- 4,000 properties,
- 1976-2002 HUD direct loan/capital advance
  - 160 projects/year with 40-50 units
- Economics somewhere between PH and FHA
- Connecticut examples used tax credit “donations”





# Early Public Housing Experience

*Monroe, Michigan (1987)*

## **60kW engine in 148-unit/7-story senior project**

- Utility opposition to installation
- Staff lacked maintenance experience
- Faced high maintenance contract cost
- Prime mover replacement 3-4 years
- Utility offered only 1.1 cents/kWh
  - Charged for “administration” and standby power
- System paid off in 5 years, shut down in 7 years



# Current Successful Public Housing Utilizing CHP

- Connecticut
  - Danbury (100 units 60kW)
  - Seymour ( 80 units 60kW)
  - Winsted ( 80 units 75kW)
- Massachusetts
  - North Adams (126 units 60kW)
  - Boston: (HOPE VI Under Construction)  
Maverick Gardens (119 units 75kW)



# Wooster Manor Public Housing

## *Danbury, CT (1998)*

### **60kW gas engine/100 unit, 7-story family building**

- Aegis Energy Service did feasibility study, installation
  - Maintains for \$10,000/year
- Converted 4 all electric floors to hot water heat
- Electricity costs went from \$116,000 to \$29,700
- Gas \$33,500 for running system 22 hours/day
- System serves 50% space, 100% hot water needs
- Yankee Gas financed 10-year \$275,000 loan
- See *Project Profile* on [www.hud.gov](http://www.hud.gov) [search “energy”]



# Early FHA Developer Concerns

Buffalo developer who decided against CHP:

- More complicated, e.g. local licensing
- Significant construction risk
- Noise
- Management skills needed
- No back-up; standby electricity needed
- Utility capacity charges eat up savings
  - \$50,000-\$60,000/year



## Current Developer's Views (1):

- Avoid utility opposition/costs: go off-grid.
- “Technology simply makes common sense:”
  - “...environmentally friendly.”
  - “...likes potential to gain LEED certification.”
- Noise no greater than standard chiller.
- MRAC/EPA **great** help with feasibility analysis.
- Public Service regulators “encouraging.”



## Current Developer's Views (2)

- Sees electric rates rising faster than gas.
- Metering and billing technologies boost income stream: “CHP can be profitable.”
- Financing “rather abundant:” e.g. suppliers.
- But marketing is “an unknown:” CHP may provide advantage, or raise tenant fears.
- Learning “takes a great deal of effort”:



# Summit Plaza Complex

*Jersey City, NJ (1974)*

**Four 600kW #2 fuel reciprocating (diesel) and one gas engine produce 3MW**

- Serve 4 residential towers with 485 units, public school with pool, commercial space
- System provides power, cooling, heating
- Saves 160,000 gallons of fuel oil a year
- Maintained by four daytime staff, off-site monitoring at night



# **2003-4 DOE-HUD CHP Working Agreement Tasks**

- Update “Cogeneration Manual”
- Work with Regional Application Centers
- Establish peer networks
- Case studies of HUD CHP projects
- Reports-brownfield, CDBG redevelopment
- CHP market analysis





# **2003-4 DOE-HUD**

## **Update “Cogen Manual”**

- 1988 NYSERDA/NYC Cogen Manual
  - What is CHP?: Q&A for apartment building owners
  - Preliminary feasibility worksheets
  - List of equipment and specifications



# **2003-4 DOE-HUD**

## **Update “Cogen Manual” (2)**

- What is CHP?

  - Provide separate general introduction

  - e.g. UK guide: “Intro to Small Scale CHP”

- Feasibility Analysis

  - Provide a separate guide for preliminary analysis.



# 2003-4 DOE-HUD

## Working with RACs

Midwest: -TA for new development

-Update Cogen Manual

Mountain: HUD staff attended kickoff.

Mid Atlantic: Explored Communications

Northeast: -Hartford HUD Envir Staff

-1,400 units existing project

-Emission Reduction Credits



# Emissions Reductions Credits

- NE RAC/Pace University Energy Project
- T. Bourgeois preparing for NYSERDA  
an ERC Guide for
  - developers CHP <2 mw
  - potential end users, e.g. multifamily.
- HUD provided lists of PHA and FHA  
projects reporting use of “fuel”
  - Useful for education, outreach



# HUD Sources of Information

- **www.hud.gov** (search for “energy”)
  - Energy Action Plan
  - District heating/cooling program reports, projects, conferences, special studies
  - Separate public housing pages
- NYSERDA Multifamily 2003 Presentation
- *Project Profiles* of successful CHP installations in Danbury, Summit Plaza

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